Amendments to the Claims

Claims 1-7 **(Canceled)**

Claim 8 **(Currently Amended)** A~~The~~ digital demodulation apparatus for amplifying, for demodulation, a digital modulated signal wave received through the air with gain automatically controlled for generating a digital signal having a predetermined amplitude, the digital demodulation apparatus comprising:

receive level variation detection means for detecting receive level variation of the received digital modulated signal wave; and

gain adjusting means for adjusting the gain based on the detected receive level variation ~~according to claim 7~~, wherein

said receive level variation detection means comprises:

tuning means for extracting a desired digital modulated signal from received digital modulated signal waves, and generating a first digital modulated signal;

automatic gain control amplification means for amplifying the first digital modulated signal with the gain, and generating a second digital modulated signal;

digitizing means for converting the second digital modulated signal into a third digital modulated signal; and

tuned signal receive level variation detection means for detecting receive level variation of the first digital modulated signal based on an amplitude of the third digital modulated signal,

said gain adjusting means adjusts the gain based on the detected receive level variation of the third digital modulated signal,

said tuned signal receive level variation detection means comprises:

amplitude detection means for detecting an amplitude value of the third digital modulated signal;

average-filtering means for carrying out average-filtering on the detected amplitude value with a predetermined averaging coefficient to detect an average amplitude value;

error detection means for detecting an error between the detected average amplitude value and a desired average value;

loop filter means for carrying out loop filtering on the detected error with a predetermined integral coefficient, and generating a stabilization signal for stabilizing an automatic gain control amplification process; and

difference detection means for detecting a difference between two arbitrary values of the stabilization signal,

said tuned signal receive level variation detection means detects the receive level variation based on the generated stabilization signal,

the receive level variation is detected based on a comparison result obtained by comparing the difference with a predetermined threshold,

said tuned signal receive level variation detection means generates a level variation signal indicating the comparison result, and said gain adjusting means controls the gain based on the level variation signal, and

said average-filtering means is an adaptive averaging filter for adaptively setting ~~said~~ the predetermined averaging coefficient based on a value of ~~said~~ the level variation signal, to enable digital signal demodulation with high quality by appropriately setting the predetermined averaging coefficient based on ~~said~~ the detected receive level variation.

Claim 9 **(Currently Amended)** The digital demodulation apparatus according to claim 8, wherein

said average-filtering means includes a first averaging coefficient and a second averaging coefficient larger than the first averaging coefficient, selects the first averaging coefficient as the predetermined averaging coefficient if the detected receive level variation in ~~said~~ the level variation signal is smaller than ~~said~~ the predetermined threshold, and selects the second averaging coefficient as the predetermined averaging coefficient if the detected receive level variation in ~~said~~ the level variation signal is not smaller than ~~said~~ the predetermined threshold.

Claim 10 **(Currently Amended)** A~~The~~ digital demodulation apparatus for amplifying, for demodulation, a digital modulated signal wave received through the air with gain automatically controlled for generating a digital signal having a predetermined amplitude, the digital demodulation apparatus comprising:

receive level variation detection means for detecting receive level variation of the received digital modulated signal wave; and

gain adjusting means for adjusting the gain based on the detected receive level variation ~~according to claim 7~~, wherein

said receive level variation detection means comprises:

tuning means for extracting a desired digital modulated signal from received digital modulated signal waves, and generating a first digital modulated signal;

automatic gain control amplification means for amplifying the first digital modulated signal with the gain, and generating a second digital modulated signal;

digitizing means for converting the second digital modulated signal into a third digital modulated signal; and

tuned signal receive level variation detection means for detecting receive level variation of the first digital modulated signal based on an amplitude of the third digital modulated signal,

said gain adjusting means adjusts the gain based on the detected receive level variation of the third digital modulated signal,

said tuned signal receive level variation detection means comprises:

amplitude detection means for detecting an amplitude value of the third digital modulated signal;

average-filtering means for carrying out average-filtering on the detected amplitude value with a predetermined averaging coefficient to detect an average amplitude value;

error detection means for detecting an error between the detected average amplitude value and a desired average value; and

loop filter means for carrying out loop filtering on the detected error with a predetermined integral coefficient, and generating a stabilization signal for stabilizing an automatic gain control amplification process; and

difference detection means for detecting a difference between two arbitrary values of the stabilization signal,

said tuned signal receive level variation detection means detects the receive level variation based on the generated stabilization signal,

the receive level variation is detected based on a comparison result obtained by comparing the difference with a predetermined threshold

said tuned signal receive level variation detection means generates a level variation signal indicating the comparison result, and said gain adjusting means controls the gain based on the level variation signal, and

said loop filtering means is an adaptive loop filter for adaptively setting ~~said~~ the predetermined integral coefficient based on ~~said~~ the level variation signal to enable digital signal demodulation with high quality by appropriately setting the predetermined integral coefficient based on ~~said~~ the detected receive level variation.

Claim 11 **(Currently Amended)** The digital demodulation apparatus according to claim 10, wherein

said loop filtering means includes a first integral coefficient and a second integral coefficient larger than the first integral coefficient, selects the first integral coefficient as the predetermined integral coefficient if the detected receive level variation in ~~said~~ the level variation signal is smaller than ~~said~~ the predetermined threshold, and selects the second integral coefficient as the predetermined integral coefficient if the detected receive level variation in ~~said~~ the level variation signal is not smaller than ~~said~~ the predetermined threshold.

Claims 12-15 **(Canceled)**

Claim 16 **(Currently Amended)** A ~~The~~ digital demodulation apparatus for amplifying, for demodulation, a digital modulated signal wave received through the air with gain

automatically controlled for generating a digital signal having a predetermined amplitude, the digital demodulation apparatus comprising:

receive level variation detection means for detecting receive level variation of the received digital modulated signal wave; and

gain adjusting means for adjusting the gain based on the detected receive level variation ~~according to claim 4~~, wherein

said receive level variation detection means comprises:

tuning means for extracting a desired digital modulated signal from received digital modulated signal waves, and generating a first digital modulated signal;

automatic gain control amplification means for amplifying the first digital modulated signal with the gain, and generating a second digital modulated signal;

digitizing means for converting the second digital modulated signal into a third digital modulated signal; and

tuned signal receive level variation detection means for detecting receive level variation of the first digital modulated signal based on an amplitude of the third digital modulated signal, and

said gain adjusting means adjusts the gain based on the detected receive level variation of the third digital modulated signal;

said tuned signal receive level variation detection means ~~further~~ comprises:

Hilbert filtering means for extracting quadrature components from ~~said~~ the third digital ~~demodulation~~ modulated signal;

detection means for detecting and correcting an error between a frequency of ~~said~~ the third digital modulated signal and an oscillation frequency of said tuning means, and frequency-converting the error-corrected third digital modulated signal into a baseband signal;

interpolation filtering means for converting ~~said~~ the baseband signal into symbol-rate frequency data based on system-clock frequency data;

roll-off filtering means for extracting low-frequency components from ~~said~~ the symbol-rate frequency data at a desired roll-off rate, and generating low-frequency, symbol-rate frequency data;

waveform equalizing means for eliminating distortion caused by a transmission path from ~~said~~ the low-frequency, symbol-rate frequency data;

error correction means correcting an error caused by the transmission path and occurring in ~~said~~ the waveform-equalized, low-frequency, symbol-rate frequency data; and

error rate detection means for detecting an error rate of ~~said~~ the third digital ~~demodulation~~ modulated signal, and

based on the detected error rate, ~~the~~ said receive level variation detection means detects ~~said~~ the receive level variation.

Claim 17 **(Currently Amended)** The digital demodulation apparatus according to claim 16, wherein

said tuned signal receive level variation detection means further comprises:

amplitude detection means for detecting an amplitude value of ~~said~~ the third digital modulated signal;

average-filtering means for carrying out average-filtering on ~~said~~ the detected amplitude value with a predetermined averaging coefficient to detect an average amplitude value;

error detection means for detecting an error between ~~said~~ the detected average amplitude value and a desired average value; and

loop filter means for carrying out loop filtering on ~~said~~ the detected error with a predetermined integral coefficient, and generating a stabilization signal for stabilizing an automatic gain control amplification process, and

said tuned signal receive level variation detection means detects ~~said~~ the receive level variation based on a comparison result obtained by comparing ~~said~~ the detected error rate with a predetermined threshold.

Claim 18 **(Currently Amended)** The digital demodulation apparatus according to claim 17, wherein

said tuned signal receive level variation detection means generates a level variation signal indicating ~~said~~ the comparison result, and said gain adjusting means adjusts ~~said~~ the gain based on the level variation signal.

Claim 19 **(Currently Amended)** The digital demodulation apparatus according to claim 18, wherein

said average-filtering means is an adaptive averaging filter for adaptively setting ~~said~~ the predetermined averaging coefficient based on ~~said~~ the level variation signal to enable digital signal demodulation with high quality by appropriately setting the predetermined averaging coefficient based on ~~said~~ the detected receive level variation.

Claim 20 **(Currently Amended)** The digital demodulation apparatus according to claim 19, wherein

said average-filtering means includes a first averaging coefficient and a second averaging coefficient larger than the first averaging coefficient, selects the first averaging coefficient as the predetermined averaging coefficient if the detected receive level variation in ~~said~~ the level variation signal is smaller than ~~said~~ the predetermined threshold, and selects the second averaging coefficient as the predetermined averaging coefficient if the detected receive level variation in ~~said~~ the level variation signal is not smaller than ~~said~~ the predetermined threshold.

Claim 21 **(Currently Amended)** The digital demodulation apparatus according to claim 18, wherein

said loop filtering means is an adaptive loop filter for adaptively setting ~~said~~ the predetermined integral coefficient based on ~~said~~ the level variation signal to enable digital signal demodulation with high quality by appropriately setting the predetermined integral coefficient based on ~~said~~ the detected receive level variation.

Claim 22 **(Currently Amended)** The digital demodulation apparatus according to claim 21, wherein

said loop filtering means includes a first integral coefficient and a second integral coefficient larger than the first integral coefficient, selects the first integral coefficient as the predetermined integral coefficient if the detected receive level variation in ~~said~~ the level variation signal is smaller than ~~said~~ the predetermined threshold, and selects the second integral coefficient as the predetermined integral coefficient if the detected receive level variation in ~~said~~ the level variation signal is not smaller than ~~said~~ the predetermined threshold.

Claim 23 **(Currently Amended)** The digital demodulation apparatus according to claim 17, wherein

said tuned signal receive level variation detection means further comprises:

PWM calculation means for converting ~~said~~ the stabilization signal into a square-wave signal represented by 0 and 1;

low-pass-filtering means for extracting low-frequency components from ~~said~~ the square-wave signal to generate a low-frequency, square-wave signal; and

gain adjusting signal generation means for generating, based on ~~said~~ the low-frequency, square-wave signal, a gain adjusting signal for adjusting gain of said automatic gain control amplification means, and

said gain adjusting means adjusts ~~said~~ the gain based on the gain adjusting signal.

Claims 24-27 **(Canceled)**

Claim 28 **(Currently Amended)** A~~The~~ digital demodulation apparatus for amplifying, for demodulation, a digital modulated signal wave received through the air with gain automatically controlled for generating a digital signal having a predetermined amplitude, the digital demodulation apparatus comprising:

receive level variation detection means for detecting receive level variation of the received digital modulated signal wave; and

gain adjusting means for adjusting the gain based on the detected receive level variation ~~according to claim 27~~, wherein

said receive level variation detection means comprises:

tuning means for extracting a desired digital modulated signal from received digital modulated signal waves, and generating a first digital modulated signal;

automatic gain control amplification means for amplifying the first digital modulated signal with the gain, and generating a second digital modulated signal;

digitizing means for converting the second digital modulated signal into a third digital modulated signal; and

tuned signal receive level variation detection means for detecting receive level variation of the first digital modulated signal based on an amplitude of the third digital modulated signal,

said gain adjusting means adjusts the gain based on the detected receive level variation of the third digital modulated signal,

said tuned signal receive level variation detection means comprises:

amplitude detection means for detecting an amplitude value of the third digital modulated signal;

average-filtering means for carrying out average-filtering on the detected amplitude value with a predetermined averaging coefficient to detect an average amplitude value;

error detection means for detecting an error between the detected average amplitude value and a desired average value;

loop filter means for carrying out loop filtering on the detected error with a predetermined integral coefficient, and generating a stabilization signal for stabilizing an automatic gain control amplification process;

difference detection means for detecting a difference between two arbitrary values of the stabilization signal;

PWM calculation means for converting the stabilization signal into a square-wave signal represented by 0 and 1; and

low-pass-filtering means for extracting low-frequency components from the square-wave signal to generate a low-frequency, square-wave signal,

said tuned signal receive level variation detection means detects the receive level variation based on the generated stabilization signal,

the receive level variation is detected based on a comparison result obtained by comparing the difference with a predetermined threshold.

said tuned signal receive level variation detection means detects the receive level variation based on the low-frequency, square-wave signal.

said tuned signal receive level variation detection means generates a level variation signal indicating the comparison result, and said gain adjusting means adjusts the gain based on the level variation signal, and

said average-filtering means is an adaptive averaging filter for adaptively setting ~~said~~ the predetermined averaging coefficient based on a value of ~~said~~ the level variation signal to enable digital signal demodulation with high quality by appropriately setting the predetermined averaging coefficient based on ~~said~~ the detected receive level variation.

Claim 29 **(Currently Amended)** The digital demodulation apparatus according to claim 28, wherein

said average-filtering means includes a first averaging coefficient and a second averaging coefficient larger than the first averaging coefficient, selects the first averaging coefficient as the predetermined averaging coefficient if the detected receive level variation in ~~said~~ the level variation signal is smaller than ~~said~~ the predetermined threshold, and selects the second averaging coefficient as the predetermined averaging coefficient if the detected receive level variation in ~~said~~ the level variation signal is not smaller than ~~said~~ the predetermined threshold.

Claim 30 **(Currently Amended)** A~~T~~he digital demodulation apparatus for amplifying, for demodulation, a digital modulated signal wave received through the air with gain automatically controlled for generating a digital signal having a predetermined amplitude, the digital demodulation apparatus comprising:

receive level variation detection means for detecting receive level variation of the received digital modulated signal wave; and

gain adjusting means for adjusting the gain based on the detected receive level variation ~~according to claim 27~~, wherein

said receive level variation detection means comprises:

tuning means for extracting a desired digital modulated signal from received digital modulated signal waves, and generating a first digital modulated signal;

automatic gain control amplification means for amplifying the first digital modulated signal with the gain, and generating a second digital modulated signal;

digitizing means for converting the second digital modulated signal into a third digital modulated signal; and

tuned signal receive level variation detection means for detecting receive level variation of the first digital modulated signal based on an amplitude of the third digital modulated signal,

said gain adjusting means adjusts the gain based on the detected receive level variation of the third digital modulated signal,

said tuned signal receive level variation detection means comprises:

amplitude detection means for detecting an amplitude value of the third digital modulated signal;

average-filtering means for carrying out average-filtering on the detected amplitude value with a predetermined averaging coefficient to detect an average amplitude value;

error detection means for detecting an error between the detected average amplitude value and a desired average value;

loop filter means for carrying out loop filtering on the detected error with a predetermined integral coefficient, and generating a stabilization signal for stabilizing an automatic gain control amplification process;

difference detection means for detecting a difference between two arbitrary values of the stabilization signal;

PWM calculation means for converting the stabilization signal into a square-wave signal represented by 0 and 1; and

low-pass-filtering means for extracting low-frequency components from the square-wave signal to generate a low-frequency, square-wave signal,

said tuned signal receive level variation detection means detects the receive level variation based on the generated stabilization signal,

the receive level variation is detected based on a comparison result obtained by comparing the difference with a predetermined threshold,

said tuned signal receive level variation detection means detects the receive level variation based on the low-frequency, square-wave signal,

said tuned signal receive level variation detection means generates a level variation signal indicating the comparison result, and said gain adjusting means adjusts the gain based on the level variation signal, and

said loop filtering means is an adaptive averaging filter for adaptively setting ~~said~~ the predetermined integral coefficient based on ~~said~~ the level variation signal to enable digital signal demodulation with high quality by appropriately setting the predetermined integral coefficient based on ~~said~~ the detected receive level variation.

Claim 31 **(Currently Amended)** The digital demodulation apparatus according to claim 30, wherein

said loop filtering means includes a first integral coefficient and a second integral coefficient larger than the first integral coefficient, selects the first integral coefficient as the predetermined integral coefficient if the detected receive level variation in ~~said~~ the level variation signal is smaller than ~~said~~ the predetermined threshold, and selects the second integral coefficient as the predetermined integral coefficient if the detected receive level variation in ~~said~~ the level variation signal is not smaller than ~~said~~ the predetermined threshold.

Claim 32 **(Canceled)**

Claim 33 **(Currently Amended)** An automatic gain controller ~~that controls~~ for controlling gain of a digital demodulation apparatus that extracts a digital modulated signal of a desired frequency from digital modulated signal waves received through the air and generates a first digital modulated signal; ~~carrying~~ carries out, for amplification, automatic-gain-controlling on the first digital modulated signal with predetermined gain and generating a second digital modulated signal having a desired amplitude value; and

~~digitizing~~ digitizes the second digital modulated signal into a third digital modulated signal, ~~said~~ the automatic gain controller comprising:

amplitude detection means for detecting the amplitude value of ~~said~~ the third digital modulated signal;

average-filtering means for carrying out average-filtering on ~~said~~ the detected amplitude value with a predetermined averaging coefficient, and detecting an average amplitude value;

error detection means for detecting an error between ~~said~~ the detected average amplitude ~~vale~~ value and a desired average value;

loop filtering means for carrying out loop filtering on the detected error with a predetermined integral coefficient, and generating a stabilization signal for stabilizing an automatic gain control amplification process;

receive level variation detection means for detecting ~~said~~ a receive level variation based on ~~said detected~~ the generated stabilization signal; and

average coefficient adjustment means for varying the predetermined average coefficient of said average-filtering means based on ~~said~~ the detected receive level variation, wherein

said average-filtering means is an adaptive averaging filter for adaptively setting the predetermined averaging coefficient based on a value of a level variation signal, to enable digital signal demodulation with high quality by appropriately setting the predetermined averaging coefficient based on the detected receive level variation.

Claim 34 **(Currently Amended)** An automatic gain controller ~~that controls~~ for controlling gain of a digital demodulation apparatus that extracts a digital modulated signal of a desired frequency from digital modulated signal waves received through the air and generates a first digital modulated signal; carries out, for amplification, automatic-gain-controlling on the first digital modulated signal with predetermined gain and generates a second digital modulated signal having a desired amplitude value; and converts the second digital modulated signal into a third digital modulated signal, ~~said~~ the automatic gain controller comprising:

amplitude detection means for detecting an amplitude value of ~~said~~ the third digital modulated signal;

average-filtering means for carrying out average-filtering on ~~said~~ the detected amplitude value with a predetermined averaging coefficient, and detecting an average amplitude value;

error detection means for detecting an error between ~~said~~ the detected average amplitude value and a desired average value;

loop filtering means for carrying out loop filtering on ~~said~~ the detected error with a predetermined integral coefficient, and generating a stabilization signal for stabilizing an automatic gain control amplification process;

receive level variation detection means for detecting ~~said~~ a receive level variation based on ~~said~~ the detected stabilization signal; and

integral coefficient adjusting means for varying the predetermined integral coefficient of said loop filtering means based on ~~said~~ the detected receive level variation, wherein

said loop filtering means is an adaptive loop filter for adaptively setting the predetermined integral coefficient based on a level variation signal to enable digital signal demodulation with high quality by appropriately setting the predetermined integral coefficient based on the detected receive level variation.

Claim 35 **(Currently Amended)** An automatic gain controller ~~that controls~~ for controlling gain of a digital demodulation apparatus that extracts a digital modulated signal of a desired frequency from digital modulated signal waves received through the air and generates a first digital modulated signal; carries out, for amplification, automatic-gain-controlling on the first digital modulated signal with predetermined gain and generates a second digital modulated signal having a desired amplitude value; and converts the second digital modulated signal into a third digital modulated signal, ~~said~~ the automatic gain controller comprising:

amplitude detection means for detecting an amplitude value of ~~said~~ the third digital modulated signal;

average-filtering means for carrying out average-filtering on ~~said~~ the detected amplitude value with a predetermined averaging coefficient, and detecting an average amplitude value;

error detection means for detecting an error between ~~said~~ the detected average amplitude value and a desired average value;

loop filtering means for carrying out loop filtering on ~~said~~ the detected error with a predetermined integral coefficient ~~(AA, AB)~~, and generating a stabilization signal for stabilizing an automatic gain control amplification process;

receive level variation detection means for detecting ~~said~~ a receive level variation based on an amplitude of ~~said~~ the received digital modulated signal wave; and

average~~averaging~~ coefficient adjusting means for varying the predetermined averaging coefficient of said average-filtering means based on ~~said~~ the detected receive level variation, wherein

said average-filtering means is an adaptive averaging filter for adaptively setting the predetermined averaging coefficient based on a value of a level variation signal, to enable digital signal demodulation with high quality by appropriately setting the predetermined averaging coefficient based on the detected receive level variation.

Claim 36 **(Currently Amended)** An automatic gain controller ~~that controls~~ for controlling gain of a digital demodulation apparatus that extracts a digital modulated signal of a desired frequency from digital modulated signal waves received through the air and generates a first digital modulated signal; carries out, for amplification, automatic-gain-controlling on the first digital modulated signal with predetermined gain and generates a second digital modulated signal having a desired amplitude value; and converts the second digital modulated signal into a third digital modulated signal, ~~said~~ the automatic gain controller comprising:

amplitude detection means for detecting an amplitude value of ~~said~~ the third digital modulated signal;

average-filtering means for carrying out average-filtering on ~~said~~ the detected amplitude value with a predetermined averaging coefficient, and detecting an average amplitude value;

error detection means for detecting an error between ~~said~~ the detected average amplitude value and a desired average value;

loop filtering means for carrying out loop filtering on ~~said~~ the detected error with a predetermined integral coefficient, and generating a stabilization signal for stabilizing an automatic gain control amplification process;

receive level variation detection means for detecting ~~said~~ a receive level variation based on an amplitude of ~~said~~ the received digital modulated signal wave; and

integral~~averaging~~ coefficient adjusting means for varying the predetermined integral coefficient of said loop filtering means based on ~~said~~ the detected receive level variation, wherein

said loop filtering means is an adaptive loop filter for adaptively setting the predetermined integral coefficient based on a level variation signal to enable digital signal demodulation with high quality by appropriately setting the predetermined integral coefficient based on the detected receive level variation.